fore, to bring out the phenomenon in such a way as to divest it of its paradoxical features. Perhaps the most insinuatingly paradoxical aspect of the phenomenon is that which is

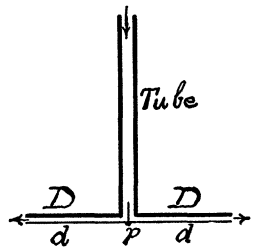

Fig. 1.

presented by the well-known toy which consists of a flat metal disk *DD*, Fig. 1, at the end of a metal tube and a light metal disk *dd*, which is hindered from moving sidewise by a pin *p* which projects into the tube. Blowing through the tube causes the disk *dd* to be held tightly against the disk *DD*.

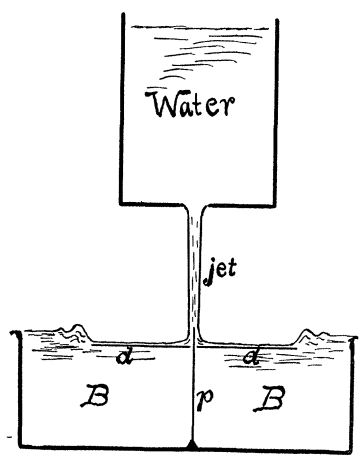

Fig. 2.

Fig. 2 shows an arrangement in which all of the essential actions which enter into the behavior of Fig. 1 are reproduced in a more easily intelligible form. A light metal disk *dd* is prevented from moving sidewise by a pin *p*, and a jet of water impinging upon the center of the disk *dd* causes it to float. The thin stream of water which moves radially outwards over the surface of the disk maintains a wall of water around the edge of the disk, and the disk floats very much as if it were a shallow pan with a metal rim. Over the surface of the disk the thin stream of water has a high velocity and a low level (pressure) and at the edge it raises itself to a higher level (pressure) as it loses its velocity. So, in the case of the apparatus shown in Fig. 1, the thin stream of air between the two disks has a high velocity and a low pressure and at the edge of the disks it raises itself to a higher pressure (atmospheric pressure) as it loses its velocity. Evidently, then, the air between the disks *dd* and *DD* of Fig. 1 is at a lower pressure than the outside air and the difference in pressure operates to hold the disks together.

W. S. Franklin.

The First Discovery of Fossil Seals in America.

To the Editor of Science: While engaged in collecting fossils for the National Museum from the northern range of the Calvert Cliffs, on the west shore of Chesapeake Bay, Maryland, during the summer and fall of 1905, I had the good fortune to find bones of true seals, which are, so far as I am aware, the first authentic remains of American fossil seals. As the Calvert Cliffs are entirely Miocene at their northern end, these bones can safely be assigned to that geological period. They will be described later in the *Proceedings* of the National Museum.

Remains from several localities in the United States, supposed to be those of seals, have been described or alluded to by Leidy and other writers, but, as shown by Dr. Allen's careful review, they are all of doubtful authenticity, 'not a single extinct species having been certainly determined.'

F. W. True.

U. S. National Museum,
Washington, D. C.,
November 23, 1905.

A Blazing Beach.

In the early part of September the papers throughout the country gave wide publicity to the occurrence of a phenomenon at Kittery Point, Me., which attracted much local consideration because of its sensational aspects, and which might be correctly described as a

'blazing beach.' On the evening of Friday, September 1, the guests at the Hotel Parkfield were startled by the appearance of flames rising from the beach and from the surface of the water, an event of so remarkable and unusual a character as to excite great curiosity and some alarm. The conflagration occurred between seven and eight o'clock in the evening, and lasted for upwards of forty-five minutes. The flames were about one foot in height. They were accompanied by a loud and continuous crackling noise which could be distinctly heard one hundred yards away, while at the same time there was a very strong liberation of sulphurous acid fumes which penetrated the hotel, drove the proprietor and his staff from the office and filled the other rooms to such an extent as to cause great inconvenience to the guests. One guest of an investigating turn of mind secured some of the sand in his hand, but was obliged to drop it on account of the heat. When some of the sand was taken into the hotel and stirred in water, bubbles of gas were liberated and produced flame as they broke at the surface in contact with the air.

Some of the attempts at explanation were of a remarkable character and illustrate how far one may be carried when the imagination is not controlled by an adequate knowledge of facts. One observer stated that some vessel in the harbor had thrown overboard a quantity of calcium carbide which had washed ashore and caught fire. The most popular explanations referred the phenomenon to the effects of the blast at Henderson's Point, some six weeks before, the theory being that the explosion of fifty tons of dynamite had opened up rock fissures to such an extent as to liberate volcanic gases; while a somewhat similar theory attributed it to the earthquake of the day before, and the consequent opening up of rock fissures. With respect to the latter it may suffice to state that the earthquake may have been a contributary factor in so far as it served to give just that shaking at a critical moment which would suffice to liberate gases stored under slight pressure. The most sensational explanation was that of a resident of the town who refused to accept the explanation I offered as altogether too commonplace, and who had 'always told the people of Kittery Point that the town was built on the edge of hell, the proof of which had now been given.'

Divesting the phenomenon of its sensational aspects, it was not difficult to reach a satisfactory explanation of all the features presented, and to eliminate explanations which had some semblance of reasonableness. The beach at the point where the fire occurred is composed of a beach ridge at its upper margin, made up of pebbles of varying size. From this ridge, a somewhat sharp slope continues the same formation outward and downward for perhaps seventy-five feet, where the pebbles are replaced by sand. This latter begins at about the half-tide mark and extends outward with a very gentle slope beyond low-water mark, so that during even the lowest tides a portion is covered by very shallow water. This sand beach extends laterally for a distance of about 175 to 200 feet, being limited in each direction by solid ledge, which forms the general construction of the shore all along the river. Over the outer portion of the sand, as also for great distances beyond, wherever there is a muddy bottom, there is an abundant growth of eel grass (*Zostera marina*) which, together with other debris of a similar nature, is continually washed upon the beach, broken up by the action of the waves and gradually buried, so that each year the deposit is increased by definite though rather slight increments. One of the well-defined features of the fire was, that it was limited to that area which is occupied by the sand. It occurred over that portion of the sand which was exposed by the falling tide, but it was also observed to extend out over the water for a distance of thirty or forty feet. Gas was found to be liberated from the exposed sand when stirred in water, and similarly gas was seen to rise from that portion of the sand covered with water. Such facts showed conclusively that the evolution of the gas was immediately connected with the sand itself and not with the adjacent rock formation, hence the theory

that rock fissures had been opened could not be regarded as resting upon a valid basis.

Observation has shown that in the salt marsh lands of the coast the underlying portions of the sod are continually undergoing decay with the formation of large quantities of sulphuretted hydrogen, with which there must also be associated certain amounts of the light carburetted and possibly also of the phosphuretted hydrogen. Personal experience has shown that such gases are stored in the decaying turf in large quantities, being often held in pockets, so that when the turf is cut they may escape in such volume as to drive one away for the time. It is also known that any decaying vegetation will produce similar results, and two explanations were, therefore, suggested as offering a solution of the problem: (1) that there was an area of buried marsh such as is known to exist in places along the coast, and that its decay had given rise to combustible gases; (2) that the accumulations of organic debris in the formation of the beach had been productive of the results observed.

That one or both of these causes would offer an adequate explanation was adopted as a tentative hypothesis, and an examination of the beach was proceeded with. It was found that the superficial layer to a depth of about one inch, consisted of freshly washed sand with which there were mingled fragments of marine plants and even fragments of land plants. Successive accumulations are thus transferred from the superficial layer to that below, which was found to be about six inches in thickness, and to consist of sand filled with all sorts of organic debris, including marine plants, fragments of wood and bones. Moreover, this layer was perfectly black, and when washed it exhibited very small, carbonized fragments of zostera and other marine plants, fragments of wood with a distinct surface charring, and bones of animals, the surface of which was like ebony. Below this layer there was a deposit of beach pebbles mingled with sand, and as this formation continued to the limits which it was possible to reach with the implements at hand—about two feet —the conclusion was reached that such was the lower construction of the beach and that no buried marsh was present. This naturally led to the final conclusion that the six-inch layer, rich in organic matter, was entirely responsible for the production of inflammable gases which had been accumulated there until favorable conditions for their release were presented.

An explanation of the spontaneous combustion of these gases is not difficult. The light carburetted and the phosphuretted hydrogen are well known to ignite spontaneously wherever produced in marsh lands, thus giving rise to the well-known 'will-o'-the-wisp,' 'Jack-o'-lantern' and the ignis fatuus, 'corpse candle,' etc., which are well known to the folk-lore of England. That sulphuretted hydrogen was also present has been abundantly shown, and since this would naturally be set on fire by the other gases, it is possible to reach a complete explanation of a phenomenon which must have occurred at more or less frequent intervals in the past, though escaping observation through lack of combination in those circumstances which would bring it under direct notice. It would seem, however, that the possibility of such combustion on a rather large scale offers a most reasonable explanation of many forest fires, the origin of which it has hitherto been impossible to account for in a satisfactory manner.

D. P. Penhallow.

Botanical Laboratory,
McGill University,
November 17, 1905.

'THE COLLAPSE OF EVOLUTION.'

To the Editor of Science: One of your correspondents, two months or so ago, sent you an outline of an argument against the doctrine of evolution delivered as an address by Rev. L. T. Townsend, professor emeritus in the theological department of Boston University. The paper may now be had as a separate.[1] This pamphlet contains so much in the way of new and surprising information, that it is

[1] Bible League, Credo Series, No. 2, National Magazine Co., Boston and American Bible League, 82 Bible House, N. Y.